

GENERAL CLIMATIC CONDITIONS.

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ATMOSPHERIC PRESSURE.

The numerical values of annual mean pressure for 1899 are given in Tables I and II. The method of reduction to sea level in use during the year was the same as in former years, with the exception that an appropriate correction for variations in the force of gravity with latitude has been applied since January 1, 1899. In other respects the annual mean values are comparable with those of the preceding and other years in which Professor Hazen's method of reduction was used.

In addition to the table of reduced pressures, referred to in the preceding paragraph, a second table has been formed (Table III), in conformity with the custom of previous years, by reducing the actual pressures to sea level and standard gravity in accordance with the tables and methods of the International Meteorological Committee, as explained in the MONTHLY WEATHER REVIEW for 1895, Volume XXIII, pages 492-494. The reduced pressures so obtained appear in Table III and on Chart I. The data in the last column of Table III are the pressures at 10,000 feet above sea level, obtained by assuming a uniform decrement of temperature at the rate of 2° F. per 1,000 feet (0.37° C. per 100 meters), as in former annual summaries; the resulting isobars are shown on Chart II.

The distribution of mean pressure at sea level for 1899 is shown by the isobars on Chart I. In general, the pressure distribution for the year 1899 differs but slightly from that of 1898. Pressure was generally above the normal east of the Mississippi River in both years. It was markedly above the normal over Nova Scotia and the Maritime Provinces of Canada in 1898 and also in 1899, although in a less degree. In the latter year the Atlantic high, as traced by the isobar of 30.05 mean annual pressure, extended several hundred miles farther to the northwestward than was the case in 1898. Pressure on the Pacific coast and Plateau region was slightly lower in 1899 than in 1898.

On the immediate Gulf coast of Louisiana, Mississippi and Alabama pressure was from .02 to .04 inch above normal in both years, while less than 200 miles inland, viz, at Vicksburg, Meridian, and Montgomery pressure was from .01 to .04 inch below normal. In both years pressure was also below normal

from the Texas coast westward to Arizona and southern California. The rainfall of both years was likewise less than the normal amount. In mentioning these facts the writer does not intend to convey the impression that they stand in the relation of cause and effect. The fact that there was an average difference of 0.07 inch in pressure between Vicksburg and New Orleans, 0.04 between Mobile and Montgomery, and the same amount between Atlanta and Jacksonville would seem to suggest rather marked changes in the normal air motions along the Gulf coast.

In the Annual Summary for 1898 attention was called to a trough of low pressure which apparently paralleled the foothills of the Rocky Mountains in that year. A similar trough appears on the pressure chart for the current year and the precipitation generally throughout the axis of the trough was above normal as in 1898.

TEMPERATURE.

Although the year was characterized by some of the coldest weather experienced within the last twenty or thirty years, the average temperature on the whole was above normal.

During the greater part of January there were no severe cold waves, but, beginning with the first week in February, the most remarkable cold wave, or series of cold waves, in the history of the Weather Bureau traversed the United States from the north Pacific to the south Atlantic coasts, damaging crops and fruits in the Southern States to a very great extent. The lowest temperatures on record since the beginning of observations were recorded at a number of points in the North Pacific coast States during the first eight days of the month. From the 9th to the 12th of the month the coldest weather on record was reported at a number of points in the Central, Western, and Northwestern States. During the 13th and 14th a cold wave overspread the Southern and Eastern States attended on the 13th by the lowest temperatures ever recorded at many points in the Southern and Gulf States. March was a cold, wintry month, and the spring was generally backward with much snow and unseasonable weather east of the Rocky Mountains.

TABLE A.—Average monthly and annual departures of temperature from the normal during 1899.

Districts.	Number of stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
New England.....	10	+0.5	-2.7	0.0	+0.9	+0.2	+2.1	+0.3	-0.2	-0.8	+1.9	0.0	+2.6	+0.4
Middle Atlantic.....	12	0.0	-5.6	+0.9	+1.0	+0.9	+1.6	0.0	+1.1	-0.9	-2.5	+1.6	+0.8	+0.2
South Atlantic.....	10	+0.2	-5.5	+2.3	-2.4	+2.1	+1.5	-0.3	+1.1	0.0	-1.9	+2.2	+1.5	+0.2
Florida Peninsula.....	2	+2.0	-1.3	+1.4	-2.3	+1.4	-0.1	-0.9	+0.7	+0.2	-0.7	+0.2	+0.2	+0.2
East Gulf.....	8	-0.8	-9.3	+1.5	-2.4	+4.3	+1.1	+0.1	+2.0	-0.7	-2.5	+5.0	-1.8	0.0
West Gulf.....	7	-0.6	-10.4	+1.6	-2.0	+3.9	+0.3	0.0	+3.5	+0.3	-3.8	+3.2	-2.1	+0.2
Ohio Valley and Tennessee.....	11	-0.4	-10.6	+0.2	+1.3	+3.4	+1.5	+0.5	+3.2	+0.1	-4.9	+4.5	-2.9	+0.5
Lower Lakes.....	8	-0.2	-5.3	-0.7	+4.3	+1.7	+1.2	-0.3	+2.2	+2.3	-4.9	+3.5	-0.2	+0.5
Upper Lakes.....	10	-0.5	-6.3	-5.0	+3.7	+2.1	+0.9	-0.6	+2.5	+2.3	-5.0	+3.0	-0.1	+0.6
North Dakota.....	3	+4.3	-5.9	-13.6	-2.0	-1.6	-1.1	0.0	-0.2	+0.7	+0.1	+12.5	+0.8	-0.6
Upper Mississippi.....	11	+2.9	-9.7	-6.4	+1.2	+1.6	+1.1	-0.1	+3.1	-0.8	-6.1	+9.1	-1.7	+0.5
Missouri Valley.....	10	-5.0	-9.8	-8.3	-1.6	+2.1	-0.6	-0.5	+3.5	-0.9	+5.2	+9.4	-3.1	+0.2
Northern Slope.....	7	+4.2	-12.2	-10.6	-3.1	-2.5	-1.1	-0.5	-1.8	+2.9	-1.8	+8.5	-0.9	-1.4
Middle Slope.....	3	-3.0	-12.1	-4.3	-0.2	+2.6	+0.4	-1.4	+4.0	+1.2	+3.6	+6.6	-2.6	+0.1
Southern Slope.....	2	-0.8	-8.9	+2.0	-1.0	+1.6	-1.9	-1.8	+6.4	+1.7	+3.2	+4.3	-1.6	+0.4
Southern Plateau.....	5	+0.5	-1.1	+0.1	+1.5	-3.1	-0.8	-0.2	-0.9	+2.9	-1.1	+2.5	+1.1	+0.2
Middle Plateau.....	3	+5.6	-0.6	-1.9	-0.2	-6.4	-0.4	+0.6	-5.6	+2.5	-3.5	+3.9	-2.9	-0.7
Northern Plateau.....	5	+6.3	-4.0	-1.3	-2.0	-5.5	-1.2	+1.2	-6.2	+4.5	-2.0	+7.9	-0.9	-0.3
North Pacific.....	8	+1.9	-1.6	-2.6	-1.6	-4.7	-2.6	+0.1	-2.9	+2.4	-0.8	+5.3	+1.5	-0.5
Middle Pacific.....	5	+2.8	0.0	-1.1	+0.5	-3.5	+0.1	-1.0	-2.6	+1.2	-1.3	+1.9	-0.9	-0.3
South Pacific.....	4	+3.3	-0.2	-1.2	+0.2	-3.8	+0.2	-0.3	-3.1	+1.3	-1.9	+1.1	+0.9	-0.3

In Idaho, Montana, and Wyoming, the western portions of the Dakotas and Nebraska temperature was below normal for four consecutive months, viz, during February, March, April, and May, and also, but in a less degree, during the months of June, July, August, October, and December.

The summer was marked by an absence of periods of continued high temperature. Very nearly normal conditions prevailed in all parts of the country.

The fall of the year was generally mild and free from sharp and decided temperature changes.

Interlake navigation began about the first of May and ended about December 17. The weather in the closing months was quite free from severe storms.

The average monthly and annual departures of temperature from the normal during 1899 by geographic districts are shown in Table A.

PRECIPITATION.

The precipitation of the year just ended was not evenly distributed. There were seven separate regions, of greater or less extent, in which more than the normal quantity of rain and snow fell, viz: (1) The Pacific coast from central California to British Columbia, including part of the central and

A drought of much greater importance, measured by its effect upon agricultural and industrial interests, prevailed throughout the region of the lower Lakes and the Middle and New England States. The fall of rain and snow on the headwaters of the streams in New England, along which so many manufacturing interests are centered, was not sufficient to give the normal summer flow in the streams, and a number of mills were obliged to shut down. In New York State numerous forest fires swept over the drought-stricken regions.

On the Pacific coast the precipitation of the last rain year, viz, September, 1898–May, 1899, was far below the normal amount. The present rain year began quite auspiciously, and there had fallen, up to December 31, considerably more than the normal amount of rain.

Table B gives the monthly departures of precipitation for each geographic district.

METEOROLOGY OF THE GREAT LAKES.

The season of navigation was remarkably free from severe storms. April and May, in which months at least one severe storm is expected, passed without any unusual atmospheric disturbance. Likewise October and November, generally considered the most dangerous months of the season, brought no

TABLE B.—Monthly and annual departures of precipitation from the normal during 1899.

Districts.	Number of stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
New England.....	10	−0.1	+0.2	+2.9	−1.4	−1.8	−0.5	+0.2	−2.0	+0.7	−1.8	−1.9	−1.8	−7.3
Middle Atlantic.....	12	−0.4	+1.8	+1.3	−1.9	−1.3	−1.0	0.0	−0.4	+0.4	−0.6	−1.6	−1.7	−5.6
South Atlantic.....	10	−0.2	+2.7	+1.4	−0.3	−1.6	−1.8	+0.3	0.0	+3.1	+0.8	−1.2	−1.4	−7.2
Florida Peninsula.....	2	+2.3	+2.3	−0.4	+0.8	−3.0	0.0	+1.4	−1.5	−0.1	+2.3	−1.8	0.0	+2.3
East Gulf.....	7	+0.2	−0.4	−1.6	−2.4	−2.8	−0.8	+1.0	−0.2	−3.0	−1.0	−1.1	+0.7	−11.0
West Gulf.....	7	+1.1	−1.6	−2.0	−1.0	−0.9	+0.3	+0.8	−2.5	−2.7	+0.6	−1.3	+0.5	−8.7
Ohio Valley and Tennessee.....	11	+0.1	−0.7	+2.5	−1.6	−0.5	−1.5	−0.6	−0.8	−1.0	−0.5	−1.5	−0.1	−6.2
Lower Lakes.....	8	−0.3	−0.8	+1.2	−1.2	+0.5	−1.8	−0.4	−2.1	−0.2	−0.9	−1.6	+0.7	−6.9
Upper Lakes.....	10	−0.8	−1.0	+0.1	−0.5	+0.3	+0.2	+0.5	−0.9	−0.2	−0.5	−1.6	+0.1	−4.3
North Dakota.....	3	−0.2	−0.3	+0.2	−0.9	+1.3	+0.3	−1.2	−0.4	−0.8	−0.3	−0.4	0.0	−2.7
Upper Mississippi.....	11	−0.6	−0.2	+0.2	−0.7	+2.5	+0.2	−0.3	+0.5	−1.3	−0.3	−0.8	−0.1	−0.8
Missouri Valley.....	10	−0.6	−0.4	−1.0	−1.0	+0.2	+0.1	−1.2	−0.7	−1.4	0.0	−0.5	0.0	−5.6
Northern Slope.....	7	+0.1	+0.1	+0.5	−0.8	−1.1	−1.0	−0.1	0.0	−0.6	+0.4	−0.1	+0.2	−0.2
Middle Slope.....	2	−0.5	−0.3	−0.2	−0.7	+0.2	+2.0	+1.8	−0.8	0.0	+1.5	+1.0	+0.3	+4.2
Southern Slope.....	2	−0.4	−1.3	−0.7	−0.2	+0.8	+1.7	+2.2	−2.6	+1.0	+0.2	+2.0	+1.0	+3.7
Southern Plateau.....	5	−0.3	−0.5	−0.4	−0.1	−0.4	+0.3	+0.5	−0.7	−0.2	−0.4	+0.1	−0.8	−2.9
Middle Plateau.....	3	−0.3	0.0	+1.1	−0.7	+0.3	−0.1	−0.1	+0.3	−0.5	+0.5	−0.3	−0.9	−0.7
Northern Plateau.....	5	−0.1	0.0	−0.4	−0.1	−0.1	−0.8	−0.3	−0.8	−0.2	+1.3	−0.8	−0.4	+0.5
North Pacific.....	8	+3.0	+1.8	−1.8	+1.0	+1.1	−0.9	−0.7	−1.7	−1.7	+1.4	+3.2	0.0	+11.1
Middle Pacific.....	5	+0.5	−3.0	+2.7	−1.6	−0.4	−0.1	0.0	−0.2	−0.4	+2.4	+3.3	−1.6	+2.0
South Pacific.....	4	+0.4	−2.5	+1.0	−0.8	−0.3	+0.5	0.0	0.0	−0.1	+1.3	0.0	−1.2	−1.7

all of the northern Plateau; (2) eastern Wyoming and the Black Hills region of South Dakota; (3) eastern Colorado, Kansas, Oklahoma, and the panhandle of Texas; (4) northern Wisconsin and the Lake Superior region; (5) southeastern Iowa and central Illinois; (6) a narrow strip of country east of the Appalachians, extending from Augusta, Ga., to Washington, D. C.; (7) the western portion of the Peninsula of Florida.

Precipitation was markedly deficient in the lower Mississippi Valley, the deficits at the two regular Weather Bureau stations in Louisiana being 25 and 29 inches, respectively. The rainfall of the Gulf States in 1898 was almost normal, and it seemed at the end of that year that the droughty conditions which had prevailed for a number of years were about to come to an end. The year just closed, however, presents the same marked deficiency in precipitation throughout the Gulf States and Texas that has characterized so many years within the last decade. The cause of the deficiency is not, at present, known.

storms of sufficient violence to seriously interfere with navigation for any length of time. The most severe storm of the season occurred on December 11 and 12 at a time, however, when a large number of vessels had gone out of commission.

The rainfall in the Lake Superior basin was above normal. The snowfall of the winter and spring months was rather heavy not only in the Superior basin but also on the northern shore of Lake Huron, particularly in the Georgian Bay region. On the other hand, precipitation was generally below normal in the basins of Lakes Erie and Michigan, and also over those portions of the watersheds of Lakes Huron and Ontario, lying within the boundaries of the United States.

There was less fog reported during the season of 1899 than during the previous season. The most fog was observed over the central portion of Lake Superior.

A large amount of ice formed on the lakes during the winter of 1898–99, but winter navigation on Lake Michigan was not suspended except during the severe cold in the early part of February.